

Program Management Review

28 Sep 2006

4QFY06



**Dr. William F. Denig, Chief
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NOAA/NESDIS

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OUTLINE



STP Program Management Review

- **STP Overview/Status (9)**
- **Space Environment Group (10)**
- **Earth Observation Group (9)**
- **Earth Geophysics Group (8)**
- **Ionospheric Program – Deep Dive (13)**
- **Concluding Remarks (1)**



WHO WE ARE

STP Overview



Solar-terrestrial Physics Division

William Denig/F Chief

Janet Brown/F, Secretary

Space Environment Group (SEG)

Eric Kihn/F, Team Lead

- Terry Bullett, AFRL
- Craig Clark/F
- Helen Coffey/F
- Ray Conkright/C
- Ed Erwin/F
- Justin Mabie/C
- Rob Redmon/F
- Herb Sauer/C
- Dan Wilkinson/F

Earth Observation Group (EOG)

Chris Elvidge/F, Team Lead

- Kim Baugh/C
- Pat Hayes/C
- Ara Howard/C
- Ben Tuttle/C
- Vacant/C
- Vacant – Data Manager/F

Earth Geophysics Group (EGG)

Sue McLean/F, Team Lead

- Patrick Alken/C
- Ron Buhmann/F
- Paula Dunbar/F
- Karen Horan/F
- Joy Ikelman/F
- Stefan Maus/C
- Rob Prentice/C
- Jesse Varner/C
- Chris Hammond/S
- Andrew Kimbrel/S
- Kelly Stroker/C
- Don Herzog/C
- Tatiana Sazonova/C
- Ruth Brocko/C

Key

F – Federal

C – CIRES/CIRA

S – Student



Personnel Changes

STP Overview



- **Gains – None**
- **Losses – None**
- **Vacancies**
 - EGG Geodesist (CIRES PRA) – applications under review
 - SEG Ionosonde Data Scientist (CIRES PRA) – initiating paperwork
 - SEG Solar Physicist (CIRES PRA) – on hold
 - EOG Data Manager (Federal) – on hold
- **Inbound – None**
- **Pending**
 - Ron Buhmann/F (EGG) – Probable retirement in 2QFY07
 - Helen Coffey/F (SEG) – Probable retirement in April '07
- **Summer Visitors**
 - Christof Aubrecht – EOG – University of Vienna, Austria
 - Kristin Mihalka – SEG/S – Hollings Scholar (Ionosphere)
 - Misha Zhizhin – SEG – Institute of Physics of the Earth RAS, Russia
 - Dima Mishin – SEG – Institute of Physics of the Earth RAS, Russia
 - Andre Polykov – SEG – Institute of Physics of the Earth RAS, Russia
 - Dale Dominey-Howes – EGG – Macquarie University, Australia



FY06 Milestones

STP Overview



AOP →

AOP →

AOP →

AOP →

PPBES Program	STP FY06 Milestones	Status	Planned Completion Date	Actual Completion Date	Responsible Person
Space Weather	Complete the rescue of the PCI data including, archive preservation, integration in the SPIDR and quality analysis.	C	(Q1) 12/31/2005	(Q1) 12/15/2005	Kihn
Space Weather	Construct a 15-year gridded database of results from linked assimilation models	C	(Q2) 3/31/2006	(Q2) 3/20/2006	Kihn
Space Weather	Complete the rescue of the RSTN data including, archive preservation, integration in SPIDR and quality analysis	C	(Q2) 3/31/2006	(Q2) 1/9/2006	Coffey
Space Weather	Publish a Looking Forward to GOES-R web announcement for current users of GOES and POES SEM data	C	(Q2) 3/31/2006	(Q2) 1/17/2006	Wilkinson
Space Weather	Add 50 Gigabytes of high resolution daily solar H-alpha images to NGDC archives	C	(Q3) 6/30/2006	(Q3) 5/20/2006	Coffey
Space Weather	Automate the collection, analysis, archive, and dissemination of the USAF ionospheric sounding stations	C	(Q4) 9/30/2006	(Q4) 9/26/2006	Redmon
Space Weather	Publish Space Weather Analysis (SWA) derived products such as indices via the web	C	(Q4) 9/30/2006	(Q4) 8/28/2006	Kihn
Space Weather	Complete migration of space weather data to the ADIC TLS: GOES SEM, POES SEM, and GOES SXI	C	(Q2) 3/31/2006	(Q2) 3/28/2006	Wilkinson
Space Weather	Integrate the NASA CDAWeb data resources with the Space Physics Interactive Data Resource (SPIDR) system.	G	(Q1) 12/31/2007		Kihn
Marine Transportation Systems	Improve resolution of crustal magnetic field model from degree 90 to 720 to improve ENC navigation models.	C	(Q4) 9/30/2006	(Q4) 9/26/2006	McLean
Tsunami	Establish archive of tsunami program DART and BPR historical data (3 GB)	C	(Q2) 3/31/2006	(Q2) 3/28/2006	Stroker
Tsunami	Review and document 60% of deadly past tsunami events	C	(Q2) 3/31/2006	(Q2) 3/28/2006	Dunbar
Marine Transportation Systems	Increase volume of CORS GPS data ingested annually and placed into the archive by 2 TB.	C	(Q2) 3/31/2006	(Q2) 3/28/2006	McLean
Marine Transportation Systems	Increase the volume of the DMSP tape library archive by 4 TB	C	(Q4) 9/30/2006	(Q4) 9/5/2006	Erwin
Marine Transportation Systems	Delivery of 3 TB of DMSP data on line.	C	(Q4) 9/30/2006	(Q4) 9/5/2006	Elvidge
Marine Transportation Systems	Generation of first global DMSP OLS imagery constructed area grid at 1 km resolution	G	(Q4) 9/30/2006		Elvidge
Marine Transportation Systems	Implementation of new near-real time satellite data processing and delivery system for DMSP OLS	C	(Q1) 12/31/2007	(Q4) 7/1/2006	Elvidge

Change this quarter

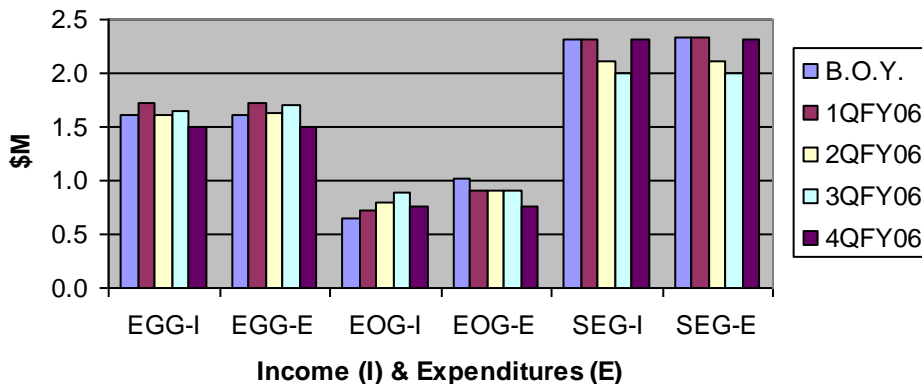


Financial STP Overview



<u>Team</u>	<u>Income</u>	<u>Expenses</u>	<u>Net</u>	<u>Status</u>
SEG	2,314.2K	2,314.2K	0.0K	G
EOG	759.1K	759.1K	0.0K	G
EGG	1,499.8K	1,499.8K	0.0K	G

STP Income & Expenditures by Group

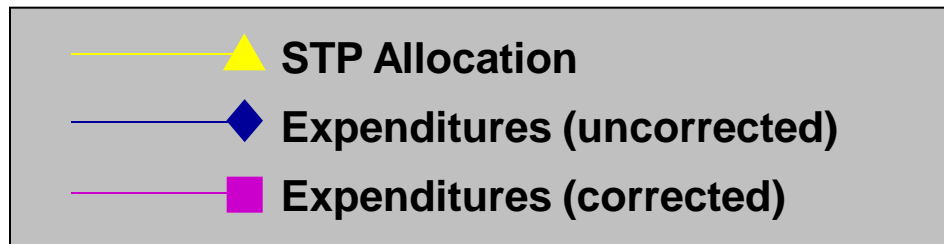
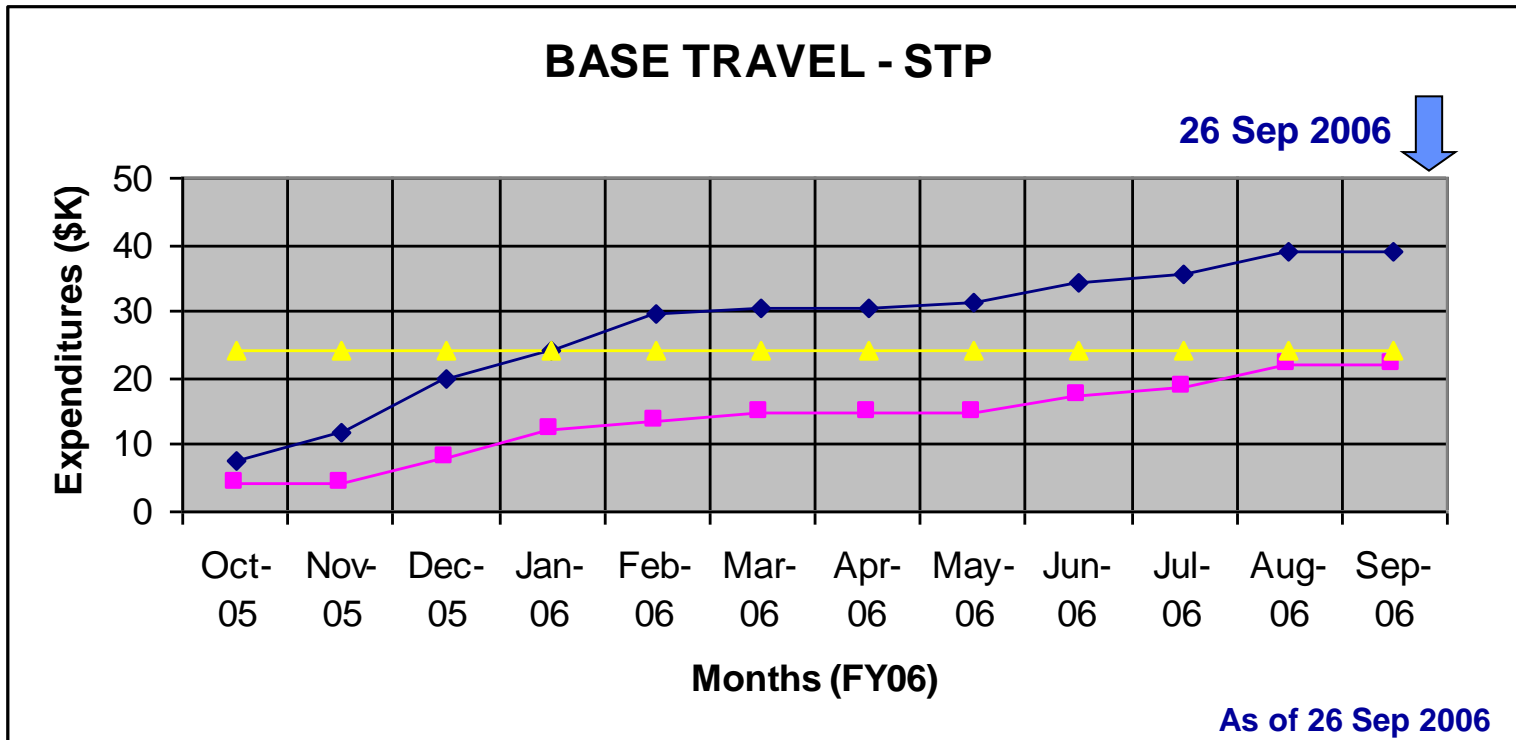


- G** Income is within 5% of Expenditures
- Y** Income is within 10% of Expenditures
- R** Income is not within 10% of Expenditures



Travel

STP Base Travel





CDMP FY06 Proposals

STP Overview



Subject	New - FY06	Continuing	POC	Contractor (\$K)	NGDC (\$K)	Comments
Heat capacity mapping mission	X		Elvidge	40.0	4.0	On-going
DMSP film scanning		X	Elvidge	800.0	75.0	On-going
Historical solar spectral data	X		Coffey	60.0	6.0	On-going
Historical solar observations		X	Coffey	85.0	8.5	On-going
Historical ionosonde records		X	<i>Redmon</i>	75.0	7.5	Restructured
Rescue of historical tsunami data	X		<i>Ikelman</i>	30.0	3.0	On-going

Change



MOUs / MOAs

STP Overview



STATUS

NGDC	Team	Type		NOAA Legal	DOC Legal	NGDC Signed	Partner Signed	Start	End	Status	
DMSP Archive	SEG	MOA	DMSP	X	X	X				Y	Awaiting DMSP signature - info only
SWx Climatology	SEG	MOU	AFCCC	X	X	X	X	27-May-04	01-Oct-14	G	In place - nothing to report
Ionospheric Data	SEG	MOU	AFWA	X	X	X	X	21-Aug-06	21-Aug-11	G	Signed this quarter
NASIC	EOG	MOU	NASIC	X	X	X	X	09-Mar-06	01-Jan-11	G	In place - nothing to report
CORS Support	EGG	n/a	NGS	X	X	X	X			Y	1-year extension in process - info only
World Mag Model	EGG	MOU	NGA	X	X	X				Y	Awaiting NGA signature - info only

Other	Team	Type		NOAA Legal	DOC Legal	NOAA Signed	Partner Signed	Start	End	Status	
SWARM	EGG	MOU	NPOESS	X	X					Y	May be O.B.E. - info only

Change this quarter

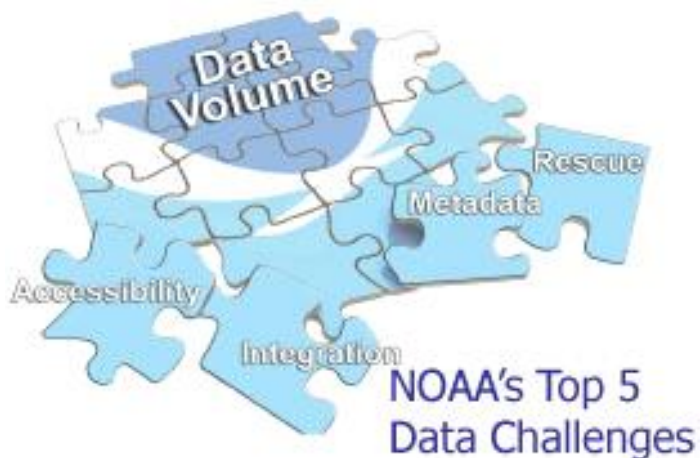


Special Interest Item

STP Metadata Records



Metadata



The Challenge – VADM Lautenbacher has identified improving NOAA metadata as one of the top 5 data management challenges for the next 10 years. (Ref: NOAA's Data Management Report, March 2006)

Purpose – Documenting data is critical in preserving its usefulness through time. STP wants to improve descriptions of data, formats, and processing steps to ensure long-term utility.

Issues: STP, led by Karen Horan, had a focused effort to review and update all of its metadata records and data in the ADIC TLS archive. **During FY06 STP updated 82% of its metadata records.**

Accomplishment: STP reviewed, updated, and published 238 metadata records and has an additional 53 records under review.

Team Members: Karen Horan led this effort working with all STP data managers

Status: Focus on establishing FGDC compliant metadata for all archived data sets and then expand content, including defining entity - attribute and instrumentation in the Remote Sensing Extension (RSE) as appropriate.



Action for the Director



SEC-NGDC Summit [*draft*] Action Items (AI)

- AI-1 Determine which NWS SWx products are archived from the NOAA Weather Wire Service (NWWS)
- AI-2 Determine the status of SEC datasets and products archived within NGDC
- AI-3 Establish a Data Interface Working Group (DIWG) to recommend roles & responsibilities for data sharing between SEC & NGDC
- AI-4 Establish an Archive Interface Working Group (AIWG) to address the resource accommodations for current and future (new) SEC data products within NGDC

Status: Final List of AIs from the 08-May-06 summit have not yet been released by Ron Zwickl.

Action for the Director – Request that you work with Dr Bogdan to get these AIs finalized and released.



Technology Thrust Areas

STP Overview



- **Space Environment Group (SEG)**
 - Space Physics Interactive Data Resource
 - Space Weather Analysis
 - CLASS Recon Force
 - Satellite SWx Data
 - Solar Data Services
 - Ionospheric Digital Database
- **Earth Observation Group (EOG)**
 - DMSP Archive, Products & Services
- **Earth Geophysics Group (EGG)**
 - Natural Hazards Database
 - Continuously Operating Reference Station
 - Geomagnetic Data & Services



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- **Concluding Remarks**

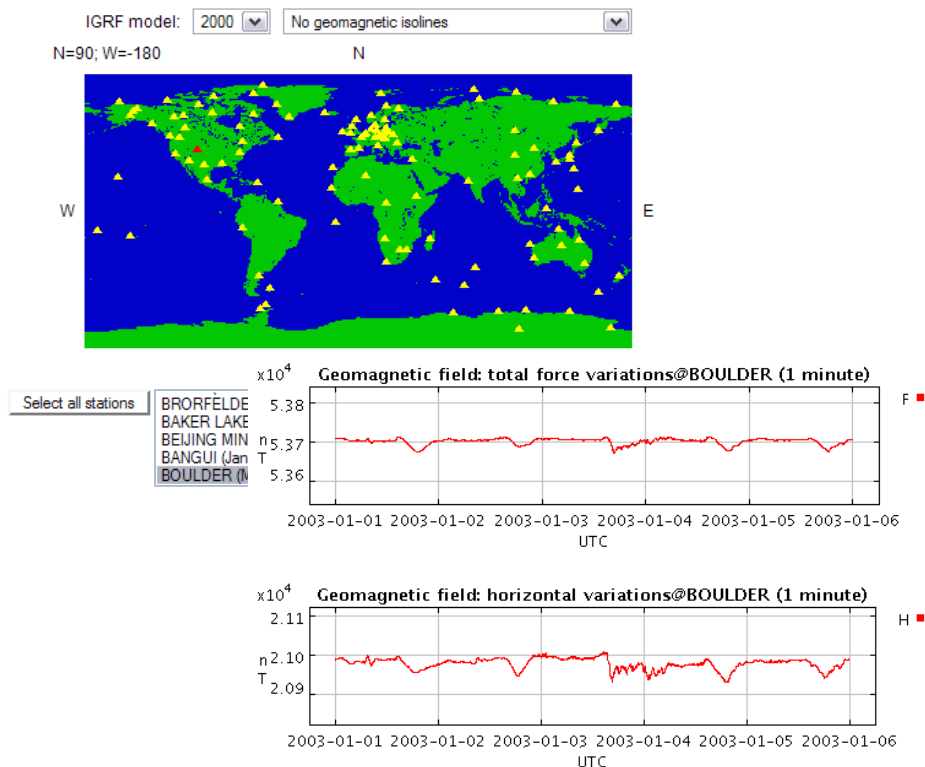
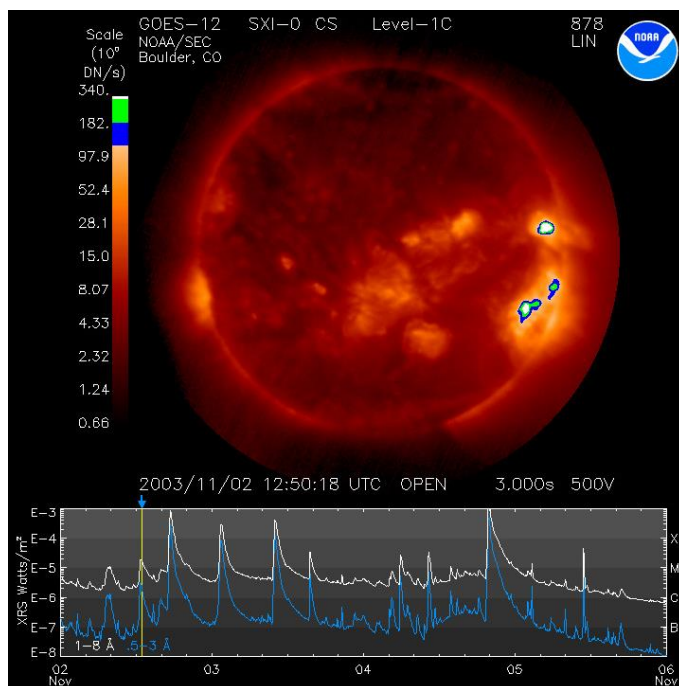


Space Environment Group Overview



The Space Environment Group is focused on the archive and management of NOAA's space environmental data. The SEG also supports international data exchange and collection through World Data Center activities.

Group Leader: Dr. Eric Kihn





STP/SEG Task

Space Physics Interactive Data Resource



Global SPIDR mirror sites



SPIDR nodes as of January 2006.

Milestones

1QFY06 – Complete PCI data rescue (**done**)

➡ **4QFY06** – Publish SWA derived products such as indices via the web (**done**)

➡ **1QFY07** – Integrate CDAWeb with SPIDR (**recommend deletion**)

Corporate Measure – % archived SWx data available on-line: 59% (FY06) to 95% (FY12)

➡ Milestone in the AOP

STP PMR – 28 Sep 2006

Background – SPIDR is a distributed network of synchronous databases and 100% Java middle-ware servers accessed via the World Wide Web. SPIDR 4.0 is in test phase.

Purpose – SPIDR allows a solar terrestrial physicist to intelligently access and manage historical space data for integration with environmental models and space weather forecasts.

Team Member: Eric Kihn, Rob Redmon, Mikhail Zhizhin

Status: Investigations into “bad” data in SPIDR continue – upcoming IRI meeting, 16-20 Oct, Buenos Aires. Dr. Kihn participated in the NASA Data Center Review at the Goddard Space Flight Center, 30Apr – 03May.

Space Weather program



STP/SEG Milestone SWx Derived Products



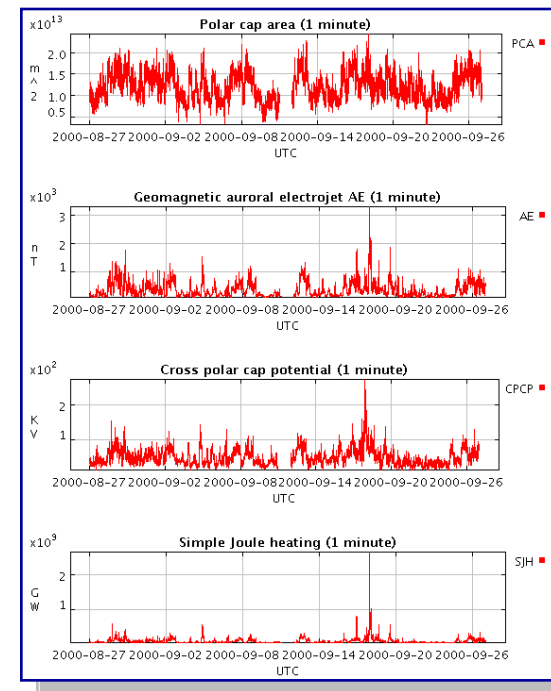
Milestone: Publish Space Weather Analysis (SWA) derived products such as indices via the web.

Program: Space Weather (Weather & Water)

POC: Dr. Eric Kihn – 303 497-6346

Status: Completed (08/28/06)

Select Data Type, Parameters and Stations						
Data Sets	Info	Metadata	FTP	Coverage	Native Time Step	Available Dates
Index Data						
AMIE derived Indices	ⓘ	Ⓜ	Ⓜ	global	1 min	Jan, 1991 - Dec, 2000 Boulder
Geomagnetic Indices	ⓘ	Ⓜ	Ⓜ	global	1, 3 hr, 1 day	Jan, 1932 - Aug, 2006 Boulder
HPI DMSP Data	ⓘ	Ⓜ	Ⓜ	10 satellites floating: about 50 min		Jan, 1983 - Feb, 2001 Boulder
HPI NOAA Data	ⓘ	Ⓜ	Ⓜ	10 satellites floating: about 100 min		Nov, 1978 - Mar, 2003 Boulder
Polar Cap Index	ⓘ	Ⓜ	Ⓜ	global	1 min	Jan, 1992 - Dec, 2002 Moscow
Solar Data	ⓘ	Ⓜ	Ⓜ	global	1 day	Jan, 200 - Aug, 2006 Boulder
Station Data						
Cosmic Ray Data (4096 format)	ⓘ	Ⓜ	Ⓜ	120 stations	1 hr	Jan, 1953 - Jun, 2001 Boulder
Cosmic Ray Data (general format)	ⓘ	Ⓜ	Ⓜ	39 stations	1 hr	Jan, 1951 - Dec, 1999 Boulder
Cosmic Ray Data (preliminary)	ⓘ	Ⓜ	Ⓜ	5 stations	5 min, 1 hr	Aug, 1991 - Apr, 2003 Boulder
Geomagnetic Annual Means	ⓘ	Ⓜ	Ⓜ	581 stations	1 month	Jan, 1813 - Jan, 2003 Boulder
Geomagnetic Hourly Means	ⓘ	Ⓜ	Ⓜ	225 stations	1 hr	Apr, 1901 - Dec, 2004 Boulder
Geomagnetic Minute Means	ⓘ	Ⓜ	Ⓜ	212 stations	1 min	Jan, 1969 - Sep, 2006 Boulder
Ionospheric Data	ⓘ	Ⓜ	Ⓜ	226 stations floating:	15 min, 1 hr	Jan, 1942 - Sep, 2006 Boulder
Radio Solar Telescope Network (RSTN)	ⓘ	Ⓜ	Ⓜ	6 stations	1 sec	Aug, 1992 - Nov, 2006 Boulder
Satellite Data						
GOES - Space Environment Monitor	ⓘ	Ⓜ	Ⓜ	8 satellites	1, 5 min	Jan, 1986 - Aug, 2006 Boulder
IMF - Interplanetary Magnetic Field by Minute	ⓘ	Ⓜ	Ⓜ	3 satellites	1, 5 min	Jan, 1974 - Sep, 2006 Boulder
IMF OMNI - Interplanetary Magnetic Field by Hour	ⓘ	Ⓜ	Ⓜ	global	1 hr	Jan, 1973 - Dec, 2002 Boulder
POES - Polar Orbiting Environmental Satellites	ⓘ	Ⓜ	Ⓜ	global	16 sec	1998 - present Boulder
Images						
DMSP Images Visible and IR	ⓘ	Ⓜ	Ⓜ	8 satellites	8 images per 101 min orbit	Jun, 1992 - Sep, 2006 Boulder
DMSP SSJ4	ⓘ	Ⓜ	Ⓜ	6 satellites	floating: 1-15 sec	Jan, 1997 - Dec, 2004 Boulder
GOES - Solar X-ray Imager	ⓘ	Ⓜ	Ⓜ	global	random	2003 - present Boulder
Nighttime Lights of the World	ⓘ	Ⓜ	Ⓜ	global	no sampling	2000 Boulder
Solar Images	ⓘ	Ⓜ	Ⓜ	global	1 day	1915 - 2003 Boulder
Other Data						



Description: The SWA calculates various proxy indices for the cross polar-cap potential (CPCP) and the auroral electrojet (AE) that are now available via the Space Physics Interactive Data Resource (SPIDR).

Significance: Modeled periods of large geomagnetic stress can be correlated to power outages, satellite anomalies, communication losses, & navigation errors.

Web: <http://spidr.ngdc.noaa.gov/spidr/index.jsp>



STP/SEG Milestone

Integrate CDAWeb and SPIDR



Milestone – Integrate the NASA Coordinated Data Analysis (CDA)Web data resources with the Space Physics Interactive Data Resource (SPIDR) system.

Background – Several years ago under Herb Kroehl NGDC started the process of integrating the CDAWeb and SPIDR systems. Funding received from NASA was used to process the POES SEM data into a format compliant with web-based services. The current effort is focused on incorporating these data into SPIDR and then linking with CDAWeb.

Completion Date - Planned: (Q1) 12/31/2006

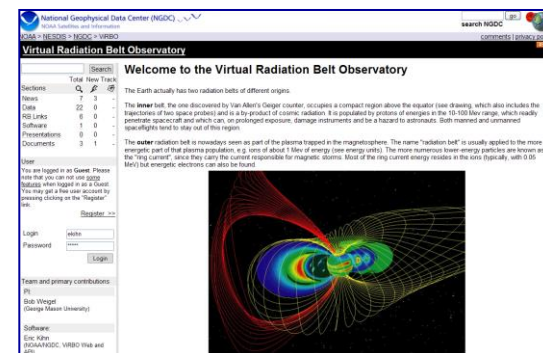
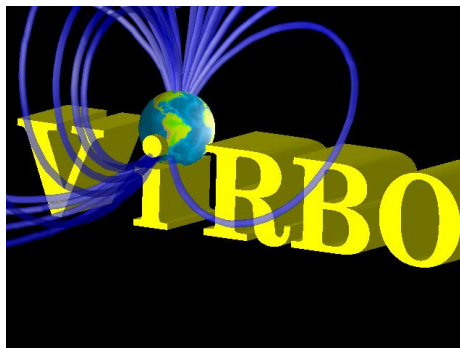
Current: ***Recommend deletion***

Status – The intent of this milestone (i.e. linked SWx data resources) has been subsumed by the Virtual Radiation Belt Observatory (ViRBO) effort through which SPIDR and CDAWeb are connected.

Web: <http://virbo.scs.gmu.edu/>

Cognizant Person: Eric Kihn

Program: Space Weather



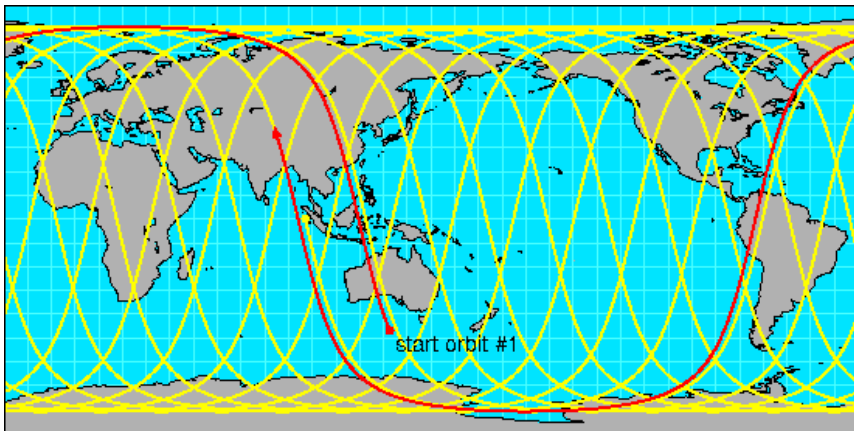


STP/SEG Task

Satellite SWx Data



POES daily orbits



Background – NGDC maintains a 30-yr historical database of satellite SWx data from DMSP, POES, and GOES

Purpose – Satellite data are used to determine extremes in SWx conditions and monitor long-term variations in the space environment. These data are also used in specific case studies in coordination with other space data.

Upcoming Milestones

2QFY06 – Publish Looking-Forward-to-GOES-R web announcement (**done**)

2QFY06 – Complete migration of SWx data to ADIC TLS; GOES SEM, POES SEM and GOES SXI (**done**)

Team Members: Dan Wilkinson, Ed Erwin

Status: NOAA-18 data have been reprocessed by SEC in order to apply proper calibration values. Nearly 1 year of data were affected and will be published on NGDC's web site with text describing the necessity of the reissue of the data.

Space Weather program



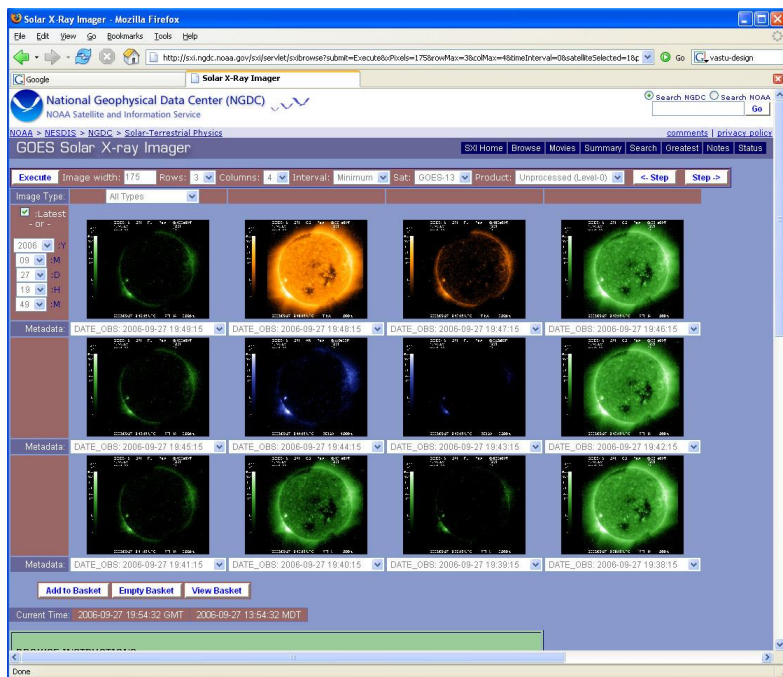
Special Interest Item

GOES-13 SXI

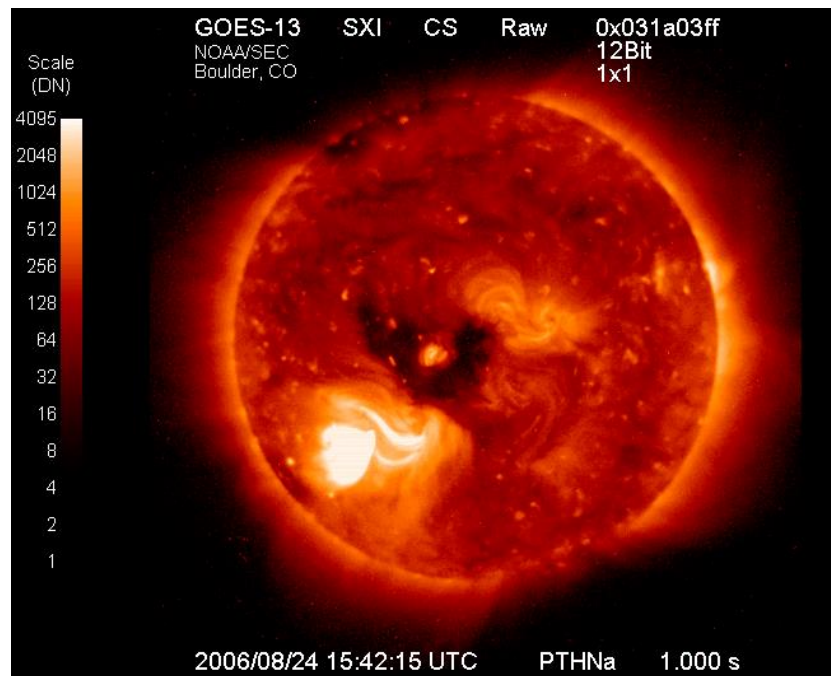


Background: As part of the Post Launch Testing (PLT) of the GOES-13 Solar X-ray Imager (SXI) NGDC is ingesting level-0 SXI data in real time. The browse imagery are being made available to the public as they come in, however, the data files themselves will not be distributed until the processing algorithms have been thoroughly tested. The browse data are available at the NGDC website.

Web: <http://sxi.ngdc.noaa.gov>



GOES-13 SXI Browse Index



GOES-13 SXI Browse Image

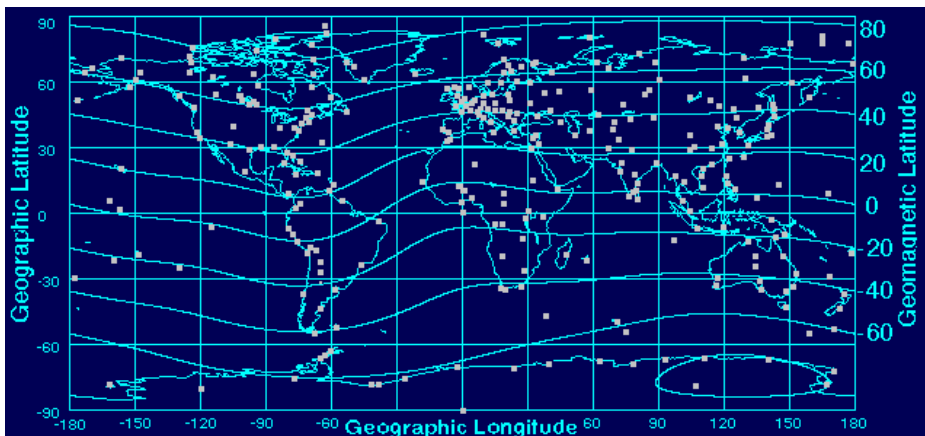


STP/SEG Task

Ionospheric Digital Database



Global Ionosonde Network



Background – Ionograms are recorded tracings of reflected ionosonde radiowave. Reflected radiowaves provide critical information on the bottomside ionosphere up to the F₂ peak in electron density.

Purpose – Historical ionogram records are used to monitor ionospheric variability and extremes. Efforts are underway to make current measurements available in near real-time to support SWx operations.

Upcoming Milestones

4QFY06 – Automate the collection, analysis, archive and dissemination of the USAF ionospheric sounding stations (**done**)

Team Members: Rob Redmon, Terry Bullett, Ray Conkright, Justin Mabie

Status: The Mirrion prototype is up and running collecting data from 30 ionosondes worldwide. The AFWA/XO (Operations Directorate) visited STP on 21 Sep 06 to discuss this and other programs – AFWA/CC scheduled to visit NGDC in Oct '06. SEC concerns over the reliability of the NGDC ionosonde database are being addressed. AFWA/CC is also addressing the SWx program.



STP/SEG Milestone

Automated Ionospheric Support



Milestone: Automate the collection, analysis and dissemination of the USAF ionospheric sounding stations.

Program: Space Weather (Weather & Water)

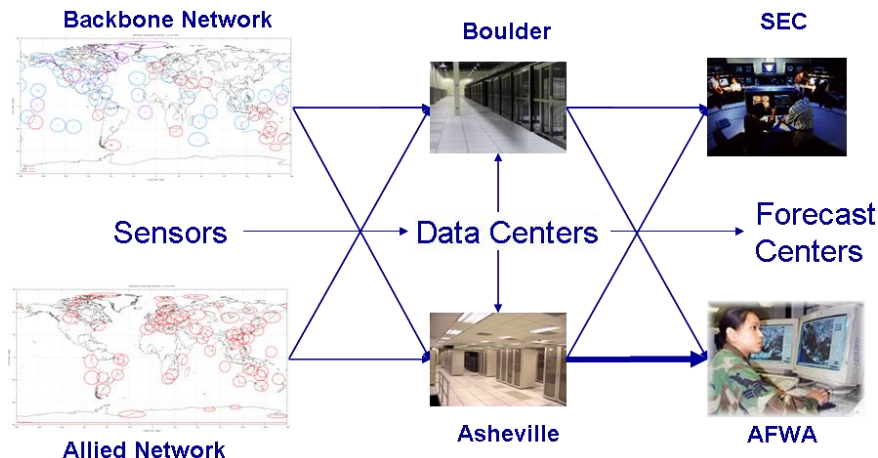
POC: Rob Redmon – 303 497-4331

Status: Completed (26 Sep 06)

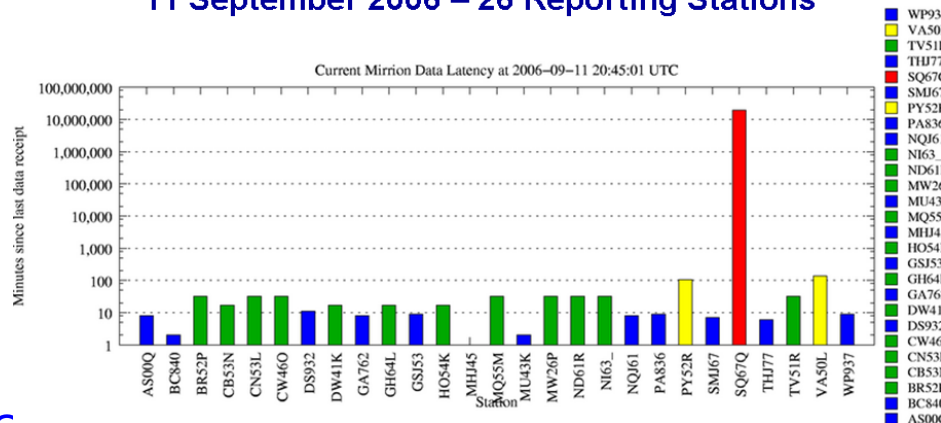
Background: Mirrion is a data management system for collecting, processing and distributing ionospheric data for SWx operations. Processed data now being transmitted to SEC (now SWPC) and AFWA.

Significance: Real-time ionosonde data are required by SWx operators for real-time users. Mirrion prototype systems overcome legacy problems in the collection, processing, and dissemination of real-time data.

Web site: <http://www.ngdc.noaa.gov/stp/IONG/iononomie.nmri>



11 September 2006 – 26 Reporting Stations





Accomplishments (FY06)

Space Environment Group



- ***SPIDR*** – New SPASE/FGDC compatible search engine
- ***Mirrion*** – Operational now serving SEC, AFWA & SPIDR
- ***CLASS*** – API prototype completed & ready for demo
- ***ViRBO*** – NGDC selected as lead VxO
- ***POES-MEPAD*** – cleaning & product algorithms complete
- ***SWA*** – 15 yrs of processed data available in SPIDR
- ***GOES-13 SXI*** – better performance + new data product



Issues & Concerns

Space Environment Group



- **SEG has critical need for 20+ Tb of spinning disk storage – with redundancy (*reference discussions with ISD*)**
- **Development of ADIC-API needed Center-wide (*Action for Tom Carey*)**
- **Upcoming retirement – Helen Coffey**



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Earth Observation Group Overview

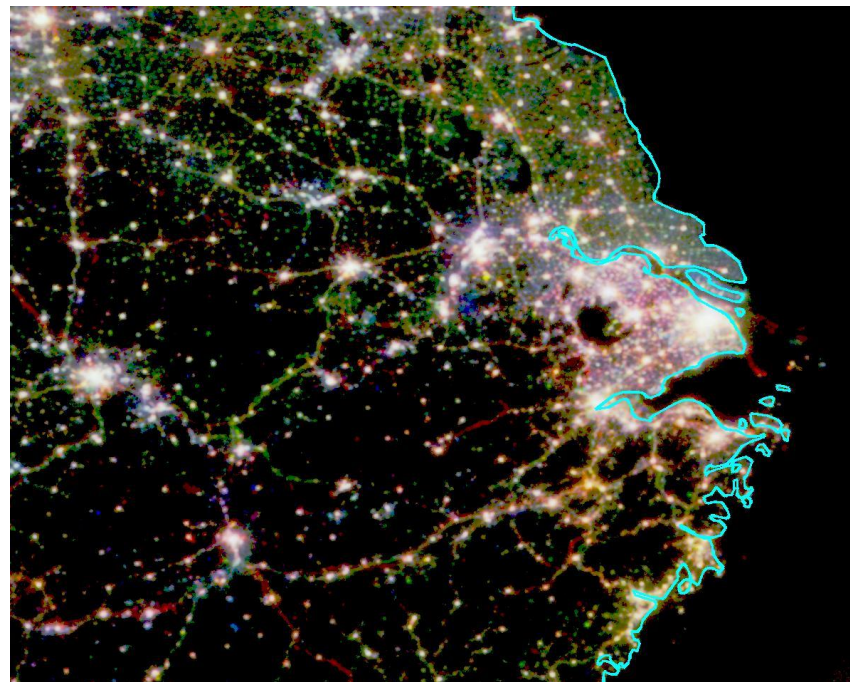


The mission of the EOG is to provide archive data management (ingest, archive and access) for NOAA and other earth observation remote sensing data, development and production of higher-level products, development of data delivery / customer base, and participation with scientific communities

Group Leader: Dr. Chris Elvidge

- Archive grows 15 GB/day
- Archive now at 56 TB¹
- Annual composites are distilled from about 1 TB of geolocated OLS data

¹Does not include DMSP “raw” data backup



DMSP-OLS Average visible band DN color composite of Shanghai (2003, 1998, 1992 as red, green, blue)

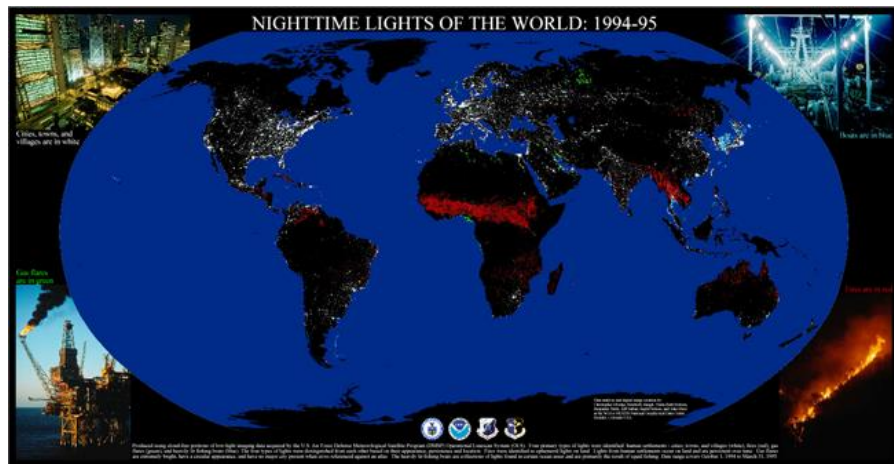


STP/EOG Task

DMSP Archive, Products & Services



NightTime Lights of the World



Background – DMSP OLS (visible and infrared) imagery from 1973 to present is used to observe lights from cities, fires, gas flares and fishing boats.

Purpose – DMSP NightTime lights are used to map changes in economic activity, population numbers and constructed area. The products are widely recognized as a key satellite observation of humanities presence on the land and ocean surface.

Upcoming Milestones

4QFY06 – Increase volume of DMSP tape library archive by 4 TB (**done**)

4QFY06 – Deliver 3 TB of DMSP data on line (**done**)

4QFY06 – Generate 1st global DMSP OLS imagery constructed on a 1-km grid (**pending**)

1QFY07 – Implement new near-real time satellite data processing & delivery system for DMSP OLS (**done**)

STP PMR – 28 Sep 2006

Team Members: Chris Elvidge, Kim Baugh, Ara Howard, Pat Hayes, Ben Tuttle

Status: Version 2 time series posted on the www. 400+ sets downloaded in first month.

www.ngdc.noaa.gov/dmsp/global_composites_v2.html

Marine Transportation System program



STP/SEG Milestone

Increase DMSP Archive Holdings by 4 TB



Milestone: Increase volume of the Defense Meteorological Satellite Program (DMSP) archive by 4 TB

Program: Marine Transportation (Commerce & Transportation)

POC: Ed Erwin – 303-497-6133

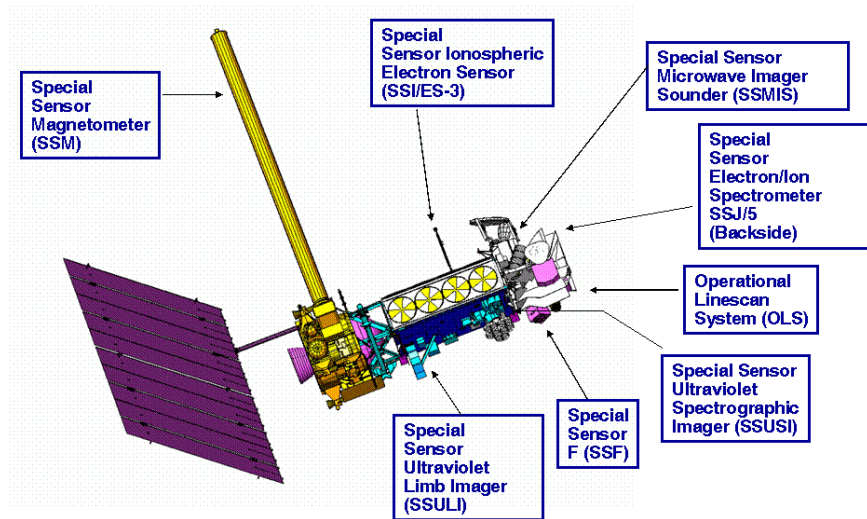
Status: Completed (05 Sep 2006)

Illustration of DMSP on-orbit



Image courtesy LMMS

DMSP BLOCK 5D-3 (F16-20) Sensor Suite



Description: NGDC is the main archive of DMSP data. Holdings include both processed and unprocessed data for space sensors. Total archive data volume exceeds 50 TB.

Significance: Historical DMSP data used to support global change research and space environment climate studies.



STP/SEG Milestone

On-line DMSP OLS Data Delivery



Milestone: Delivery of 3 TB of Defense Meteorological Satellite Program (DMSP) data on-line.

Program: Marine Transportation (Commerce & Transportation)

POC: Dr. Chris Elvidge – 303 497-6121

Status: Completed (05 Sep 2006)

Description: DMSP Operational Linescan System (OLS) data are used to generate global mosaics of nighttime lights and other specialized products.

Significance: Subscription service provided to organizations & NOAA international partners. Increases NGDC positive visibility.





STP/EOG Milestone

Global Impervious Surface Area Grid



Milestone – Generation of first global constructed area grid at one kilometer resolution for year 2000-01.

Background – For use in modeling development impacts on terrestrial carbon dynamics under NASA funded research project.

Completion Date - Planned: (Q4) 9/30/2006

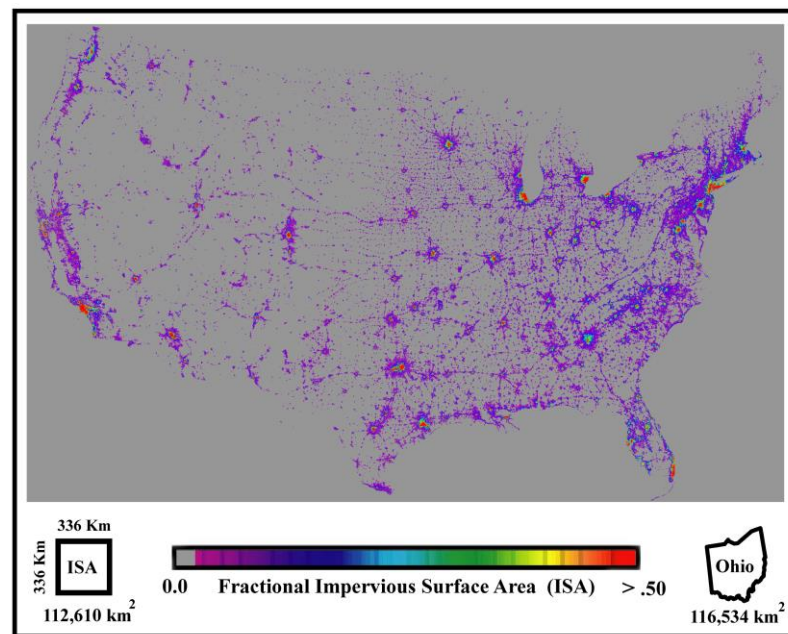
Current: (Q4) **Pending** 9/29/2006

Status – Completing. A year 2000-2001 Landsat derived 30 meter constructed area grid covering about a third of the USA was obtained from the USGS. This was aggregated to a 1-km grid and a statistically significant relationship was found for predicting constructed area using radiance calibrated nighttime lights for the 2000-2001 time period. With this we have produced the first global grid defining the spatial distribution and density of constructed impervious surfaces.

Cognizant Person: Chris Elvidge

Program: Marine Transportation System

Web: http://dmisp.ngdc.noaa.gov/html/download_isa2000_2001.html



Elvidge et al., EOS, 85, 233-240, 2004



STP/SEG Milestone

Real-time OLS Imagery



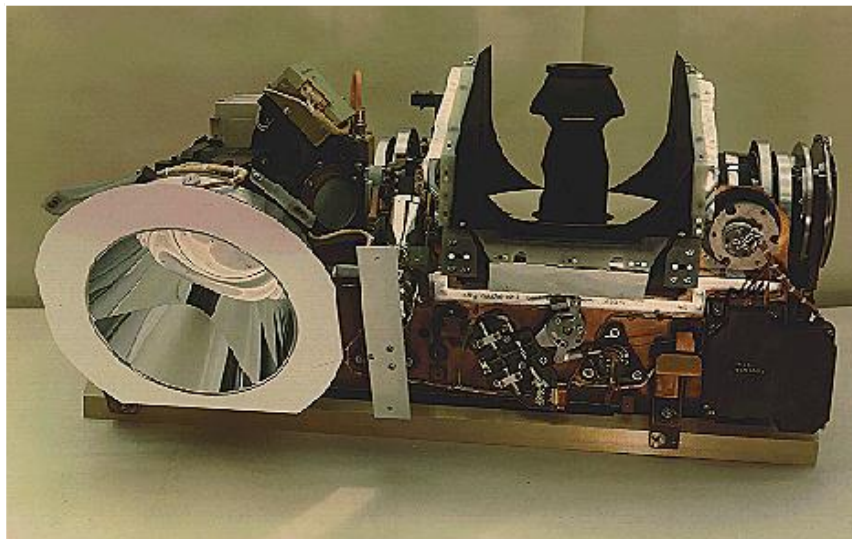
Milestone: Implementation of new near-real-time satellite data processing and delivery system for DMSP OLS

Program: Marine Transportation (Commerce & Transportation)

POC: Dr. Chris Elvidge – 303 497-6121

Status: Completed (05 Sep 2006)

DMSP Operational Linescan System (OLS)



Photograph courtesy NGC

New Orleans – 30 Aug 05



**OLS
change
detection
following
hurricane
Katrina**

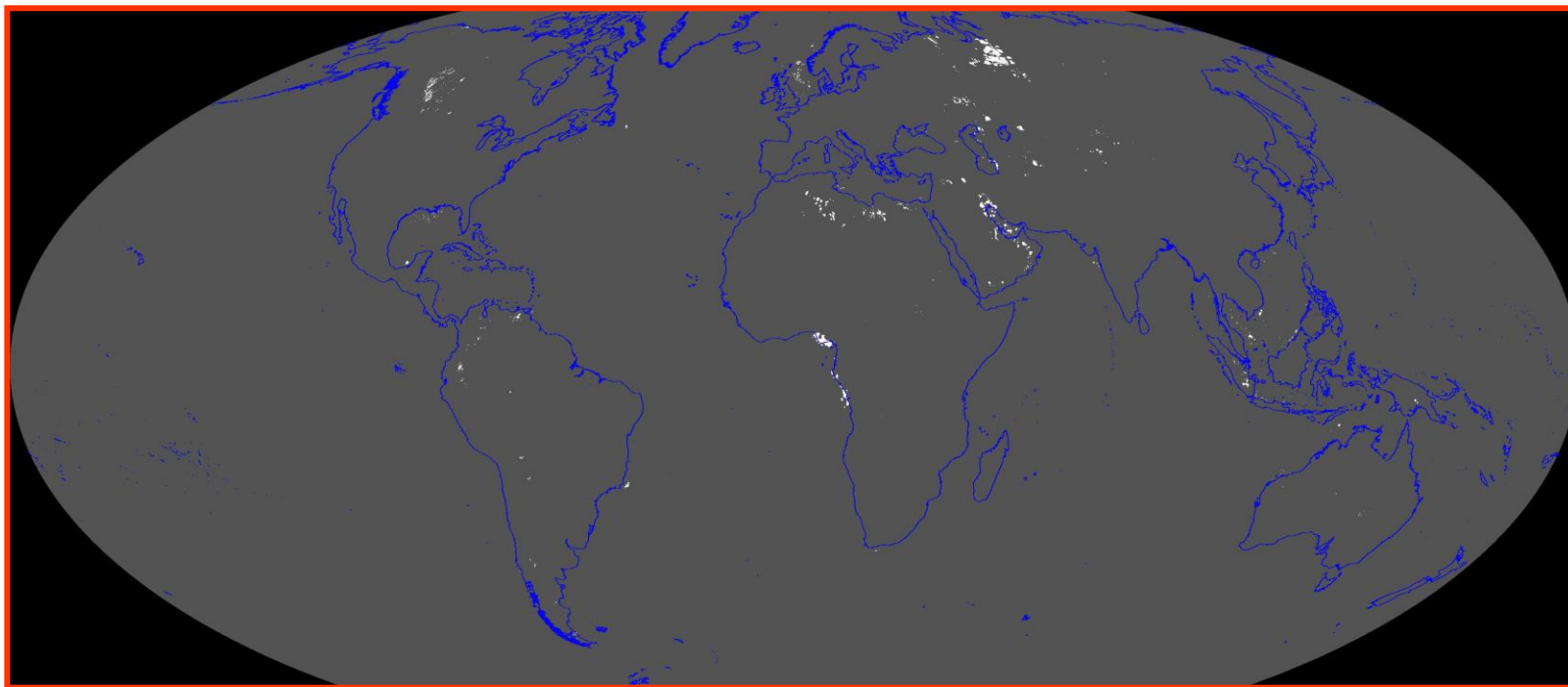
Description: NGDC has developed techniques to monitor short-term and long-term changes in localized lighting.

Significance: Increases NGDC capability to support disaster relief efforts, detection of forest fires and global gas flaring.



New Product - EOG

DMSP Global Gas Flaring Detection



DMSP F15 2004 Global Gas Flaring

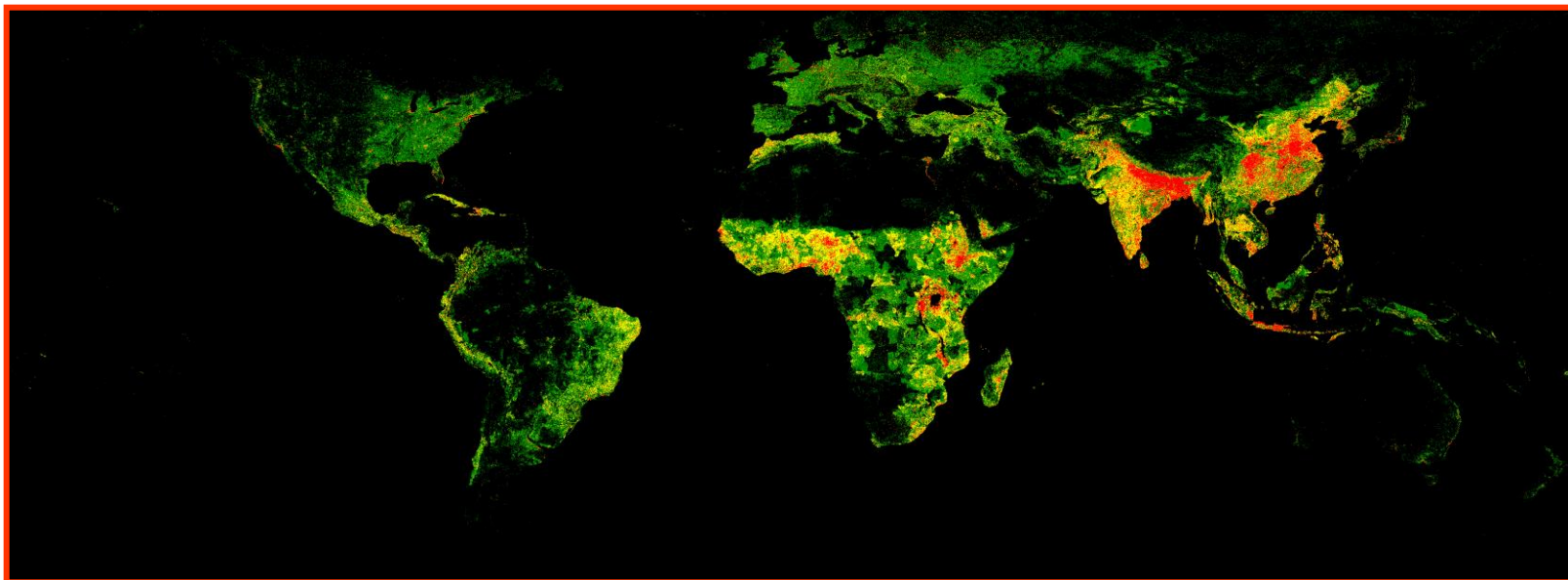
Mollweide Projection – 1 km Equal Area Grid

Average Digital Number of Lights x Percent Frequency of Detection



New Product - EOG

Satellite Derived Global Poverty Map



First Satellite Derived Global Poverty Map

Population Count in Poverty

Green 1-10, Yellow 11-50, Red > 50



Accomplishments (FY06)

Earth Observation Group



- 4 peer-reviewed publications
- **Implemented new near-RT DMSP-OLS processing**
- Found reliable source found for DMSP bevel vectors
- **Demonstrated capability to reprocess DMSP data from ADIC**
- Tested 800 GB/day data transfer rate to MAFF Japan
- “Rescued” 1978-80 Heat Capacity Mapping Mission data
- **Conducted 1st global assessment of gas flaring trends**
- **Developed 1st satellite derived global map of poverty**
- Produced global radiance calibrated nighttime lights (preliminary)
- Produced 1st global map of constructed impervious area density
- Initiated cloud-free, lunar-cycle nighttime lights composites
- **Prototyped production of near-RT global VIS and IR mosaics**
- Demo’ed web mapping access to EOG global products



OUTLINE



STP Program Management Review

- **STP Overview/Status**
- **Space Environment Group**
- **Earth Observation Group**
- ➔ • **Earth Geophysics Group**
- **Ionospheric Program – Deep Dive**
- **Concluding Remarks**



Earth Geophysics Group Overview



The focus of the EGG is to provide scientific stewardship, products, & services for data from Earth's physical environment supporting safe navigation and mitigating the impact of geophysical hazards. The EGG also supports international data collection, exchange and visiting scientists through the WDC.

Group Leader: Susan McLean





STP/EGG Task

Natural Hazards Database



Prince William Sound Alaska Tsunami - 1964



Background – NGDC acquires, processes, analyzes & disseminates socio-economic & technical data on natural hazards, including earthquakes, tsunamis & volcanoes.

Purpose – Long-term data from natural hazards, including photographs, can be used to establish the past record of natural hazard event occurrences. These data are also important for planning, response and mitigation of future events.

Upcoming Milestones

2QFY06 – Review and document 60% of the deadly past tsunami events (**done**)

➡ **2QFY06** – Increase volume of historic tsunami, DART, bathymetric & model data described, archived & accessible on-line (**done**)

Corporate Measure: % of NOAA tsunami observational data streams archived to NARA standards: 30% (FY06) - 100% (FY13)

STP PMR – 28 Sep 2006 ➡ Milestone in the AOP

Team Members: Susan McLean, Paula Dunbar, Joy Ikelman, Karen Horan, Kelly Stroker, Jesse Varner, Tatiana Sazonova, and Ruth Brocko

Status: Focus on Hazard Assessment and Data Management Reports, PoP

Recent Deliverables: IT Planning Matrix, Tsunami Program Description, Corporate Measures

Tsunami program



Tsunami Risk Assessment

Seaside, Oregon



Dr Dale Dominey-Howes
Marquarie University
Sydney, Australia



Significant Result – Collaborative study involving Dr. Dominey-Howes, Paula Dunbar (NGDC), and Jesse Varner (CIRES/NGDC) has the potential of being a significant finding in tsunami risk assessments and disaster preparedness.



Seaside, Oregon

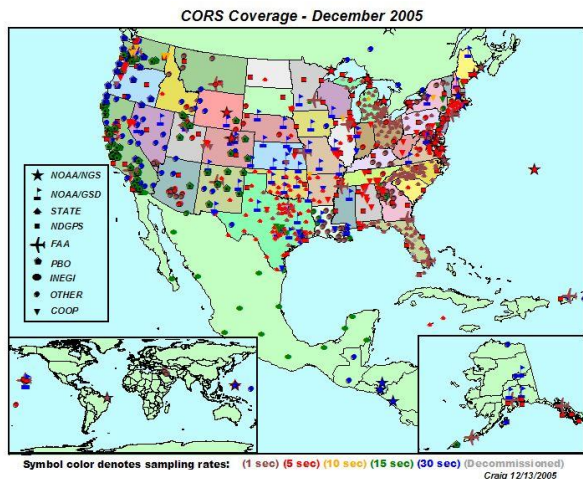


STP/EGG Task

Continuously Operating Reference Station



CORS Coverage



Background – NOAA / NGS coordinates a network of continuous GPS receivers for 3-dimensional positioning activities throughout the US and its territories.

Purpose – NGDC is an operational backup for the primary NGS site (in Silver Spring, MD). NGDC also supplies CORS data in near real-time to NOAA SEC and GSD for use in ionospheric and weather specification and forecast models.

Upcoming Milestones

2QFY06 – Increase volume of CORS GPS data ingested annually & placed into the archive by 2 TB (**done**)

MOU Status – A 1-year extension to the NGS / NGDC Agreement for CORS-West is in draft stage (at NGS) - work on a new 3-year agreement deferred until fall 2006.

Team Members: Susan McLean, Ron Buhmann, Ernie Joynt, Rob Prentice (10%), Karen Horan, Vacancy – CIRES PRA re-advertised July 2006

Status: Re-advertised the CIRES position.
Start date for new NGS PhD at NGDC is TBD. NGDC will host NGS Presidential Management Fellowship employee 6 months (FY07)

Marine Transportation System program

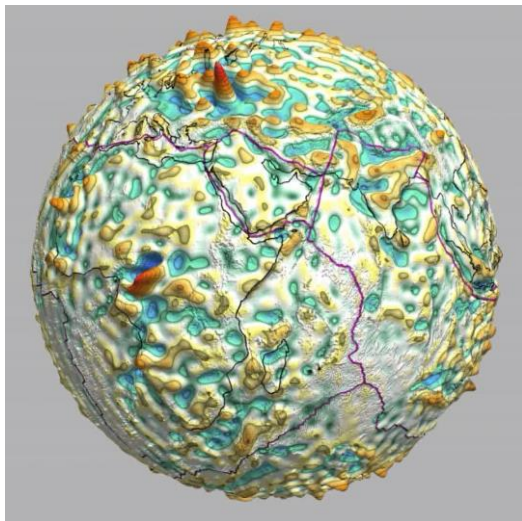


STP/EGG Task

Geomagnetic Data & Services



Crustal Magnetic Field



Background – The WMM is the standard magnetic model used by US military/civilian agencies and allied nations. The WMM is a product of the United States National Geospatial-Intelligence Agency. NGDC and the British Geological Survey jointly produce the WMM.

Purpose – Develop an enhanced earth magnetic model describing the main and crustal field contributions for improved navigation.

Upcoming Milestones

4QFY2006 – Improve resolution of crustal mag field from degree 90 to degree 720 to improve Electronic Navigation Chart (ENC) navigation models (**done**)

Team Members: Susan McLean, Stefan Maus, Tanya Sazanova, Karen Horan, Patrick Alken, Chris Hammond, Andrew Kimbrel, Don Herzog

Status: Task continuing on track. Dr. Maus spent the summer at *Institut de physique du globe de Paris* studying crustal magnetic field dynamics. NGDC 720-degree mag model completed.

Marine Transportation System program



STP/EGG Milestone

Geomagnetic Data & Services



Milestone: Improve resolution of crustal magnetic field model from the current degree 90 model to degree 720 to improve Electronic Navigation Chart (ENC) navigation models.

Program: Marine Transportation (Commerce & Transportation)

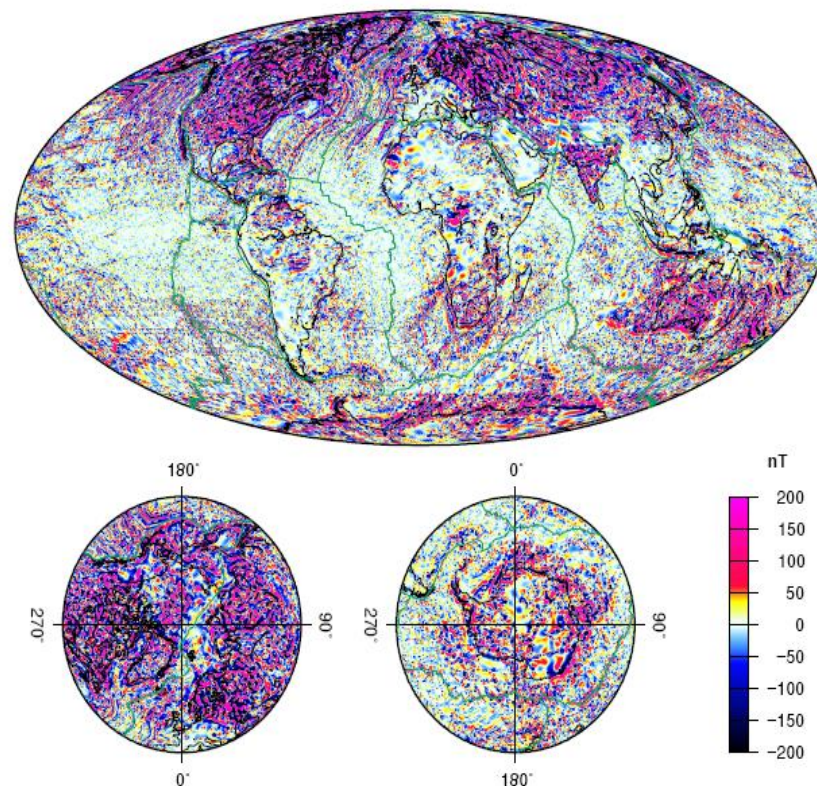
POC: Dr. Stefan Maus – 303 497-6522

Status: Completed (26 Sep 2006)

Description: NGDC produces the World Magnetic Model navigation product for the National Geospatial-Intelligence Agency. The WMM is the standard navigation model for the US DoD, DOC, DOT; NATO, and others.

Significance: The 720-degree model of the earth's main and crustal field will provide unprecedented accuracy in navigation.

Web: <http://www.ngdc.noaa.gov/seg/EMM/>





Accomplishments – FY06

Earth Geophysics Group



- **Report to Congress on NOAA's Data Management complete**
- DART Retrospective Archive established; data and metadata online
- **Completed QA / QC of ~40% of the historic tsunami database**
 - 100% of US coastal runups, 60% of deadly events
 - Contributed to March 2006 National Geographic map on earthquake hazards
- **Added 4,457 Volcanic Events to historic event database & integrated with hazards search engine**
- CORS archive increased from 8.6 Tb to 17 Tb
- **Expanded SEC CORS data services to include Canadian GPS data at 15-minute latency**
- Staff attended several major conferences, presented papers / posters, worked with data providers
- 14 papers published in peer-reviewed journals (2005-2006)
 - 6 papers submitted or in print



Issues & Concerns

Earth Geophysics Group



➤ Vacancies

- CIRES PRA Geodesist (advertised / offer made and declined June 2006 / re-advertised July 2006 / interview starting next week)

➤ NTHMP Hazards Assessment Underway

- Multi-agency effort (NOAA, USGS, States, & University)
- Paula Dunbar NOAA lead
- Final deliverable due October 2006

➤ Serving Times Series Data

- Reviewing content & capability for geomag data in SPIDR
- Expanding geomagnetic station histories in SPIDR
- Moved the DART data to Oracle where new dynamic plot capability is being tested (Kudos - Rob Prentice)

NTHMP = National Tsunami Hazard Mitigation Program



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NGDC Ionospheric Program

URSI/AGI Sp. Committee on WWS



Photograph courtesy of Ray Conkright - taken in Lindau, 28-30 March 1957

Back row (left to right); Rivault, Rawer, R. Wright, Haulbert, Theissen, Becker;
Front row (left to right): Belrose, JW2, Shapley, Piggott



NGDC Ionospheric Program Chronology



- 1942 Interservice Radio Propagation Laboratory (IRPL) formed within NBS (D.C.)
- 1944 IRPL begins publishing of monthly “Ionospheric Data” bulletin**
- 1946 Central Radio Propagation Lab (CRPL) forms within DOC under NBS
- 1954 CRPL moves to Boulder
- 1957 World Data Center-A for Airglow and Ionosphere established within CRPL**
- 1958 Boulder ionosonde (BC840) becomes operational**
- 1965 Environmental Sciences Services Administration (ESSA) formed and National Environmental Satellite Center (NESC) established
- 1972 National Geophysical & Solar-terrestrial Data Center (NGSDC) formed
- 1982 NGSDC renamed the National Geophysical Data Center (NGDC)
- 1984 NGDC suspends publication of “Ionospheric Data” bulletin**
- 1994 Space Physics Interactive Data Resource (SPIDR) v1.0 released
- 2004 Boulder ionosonde upgrade – included real-time SPIDR ingest (21 Mar 04)**
- 2005 Dr. Terry Bullett relocates to NGDC as AFRL liaison
- Ongoing Boulder “new-generation” dynasonde installation**
- Ongoing Mirrion becomes operational – provides RT ionosonde support to SWPC**
- Ongoing Construction of new ionosonde at Wallops Island in conjunction with AFRL**



WDC-STP Data Holdings Paper Records



f_oF_2 (Characteristic)							
Mc/s (Unit)							
JANUARY, 1952 (Month)							
Observed at KIHHEI, MAUI, HAWAII							
Lat. 20.8° N, Long. 156.5° W							
Day	00	01	02	03	04	05	06
1	(3.7) ^F	(6.2) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T
2	3.2	(3.1) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T
3	A	A	(2.7) ^F	(2.6) ^F	(2.2) ^F	2.2 ^F	1.8 ^F
4	3.5 ^F	4.2	4.2	2.4	2.2	(1.7) ^A	[2.0] ^A
5	4.2	4.7 ^J	3.7	(4.1) ^F	(4.3) ^F	(3.4) ^F	(3.5) ^F
6	(2.9) ^V	(2.8) ^V	3.0	2.9	3.3 ^V	3.2 ^J	3.0

IONOSPHERIC DATA																							
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
1	(3.7) ^F	(6.2) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T	(3.7) ^F	(6.2) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T	(3.7) ^F	(6.2) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T	(3.7) ^F	(6.2) ^F
2	3.2	(3.1) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T	3.2	(3.1) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T	3.2	(3.1) ^F	(4.7) ^F	(4.3) ^S	(2.5) ^S	[2.2] ^A	1.4 ^T	3.2	(3.1) ^F
3	A	A	(2.7) ^F	(2.6) ^F	(2.2) ^F	2.2 ^F	1.8 ^F	A	A	(2.7) ^F	(2.6) ^F	(2.2) ^F	2.2 ^F	1.8 ^F	A	A	(2.7) ^F	(2.6) ^F	(2.2) ^F	2.2 ^F	1.8 ^F	A	A
4	3.5 ^F	4.2	4.2	2.4	2.2	(1.7) ^A	[2.0] ^A	3.5 ^F	4.2	4.2	2.4	2.2	(1.7) ^A	[2.0] ^A	3.5 ^F	4.2	4.2	2.4	2.2	(1.7) ^A	[2.0] ^A	3.5 ^F	4.2
5	4.2	4.7 ^J	3.7	(4.1) ^F	(4.3) ^F	(3.4) ^F	(3.5) ^F	4.2	4.7 ^J	3.7	(4.1) ^F	(4.3) ^F	(3.4) ^F	(3.5) ^F	4.2	4.7 ^J	3.7	(4.1) ^F	(4.3) ^F	(3.4) ^F	(3.5) ^F	4.2	4.7 ^J
6	(2.9) ^V	(2.8) ^V	3.0	2.9	3.3 ^V	3.2 ^J	3.0	(2.9) ^V	(2.8) ^V	3.0	2.9	3.3 ^V	3.2 ^J	3.0	(2.9) ^V	(2.8) ^V	3.0	2.9	3.3 ^V	3.2 ^J	3.0	(2.9) ^V	(2.8) ^V

Paper Record of $\{f_oF_2\}$
Maui, January 1952

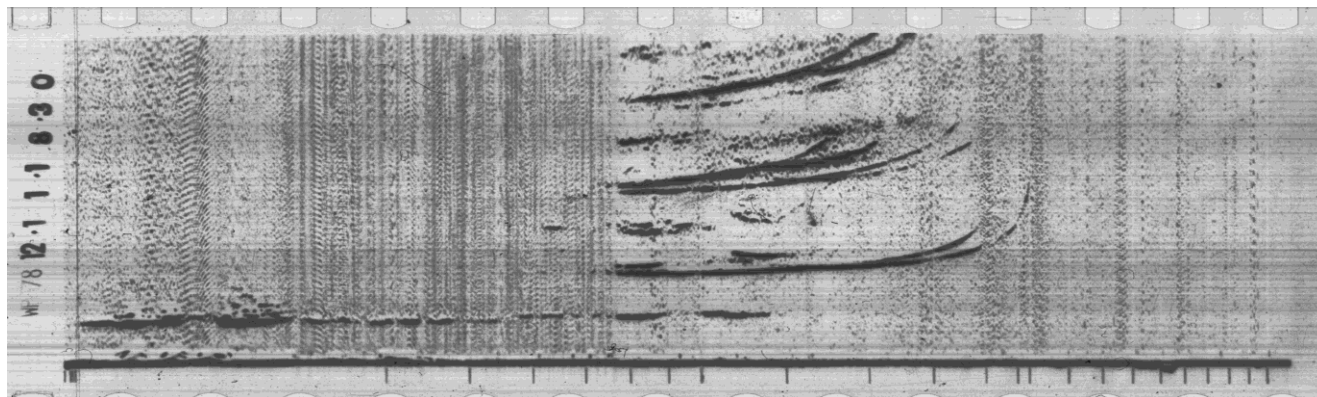
NGDC ionosonde holdings include papers records from up to **405 stations** [TBD] spanning the years 1936-1999 (mostly 1938-1957). Included per page are standard ionospheric parameters; f_oF_2 , $M_{3000}F_2$, $h'F_2$, f_oF_1 , . . . Total data volume is approximately **16,000 station-months** on ~190,000 pages contained within 59 18"x12"x12" boxes. Records are stored in the NGDC climate controlled warehouse in Boulder. Efforts to key enter these data are currently on-hold due to limited staffing. Tentative plans are to digitize the raw paper records.

WDC-STP Data Holdings

Film Ionograms



Film canisters within the NGDC warehouse



Wallops Is. ionogram @ 1830 UT on 11 Dec 78

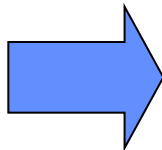
The NGDC archives include ~12,000 film rolls of ionograms for the period 1936-1993 (main years 1957-1980). Total data volume for is approximately **17,000 station-months** (up to **160 stations**). These film rolls are stored in the NGDC climate controlled warehouse in Boulder and at the Denver Federal Records Center. Program has been initiated to digitize these film records through the NOAA Climate Data Modernization Program (CDMP). Total number of ionograms is ~50 million.

WDC-STP Data Holdings

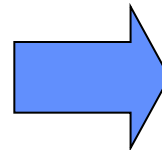
Digital Ionograms on Tape



9-Track Tape
19XX – 19XX



LTO2/3 Tape
Cartridges



Tape Library
System

The NGDC archive at one time included 23,008 9-track tapes containing digital ionograms received between 1981 and 1999. In 1992 NGDC began the systematic transfer of 9-track data to IBM 3480 tape media for the Tivoli Tape Library System (TLS). Data was subsequently transferred to LTO2/3 tape media for the ADIC TLS. Total archive volume consists of **~23,000 station months**. NGDC is working recover a significant portion of the digital archive impacted by lost sector boundaries and unknown formats.

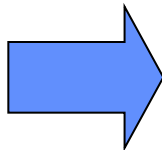


WDC-STP Data Holdings

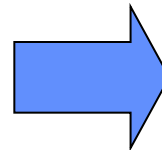
Real-Time Digital Ionograms



**Ionosonde
Station**



**NGDC
Workstation**

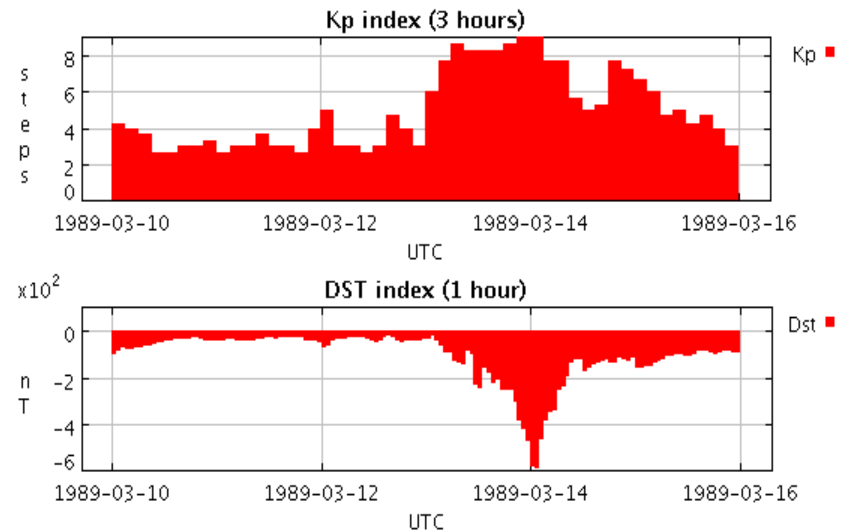


**Tape Library
System**

Since 1979 NGDC has been receiving raw and processed digital ionograms from up to **50 stations** worldwide. Total holdings currently consist of **~6,000 station months**. NGDC is currently prototyping the new Mirrion system of real-time collection, processing, and dissemination of ionosonde data for operational customers.

Web: <http://www.ngdc.noaa.gov/stp/IONO/ionohome.html>

Global SPIDR mirror sites



Background – SPIDR is a distributed net-work of synchronous databases and 100% Java middle-ware servers accessed via the World Wide Web. SPIDR 4.0 is in test phase.

Purpose – SPIDR allows a solar terrestrial physicist to intelligently access and manage historical space data for integration with environmental models and space weather forecasts.



Grahamstown IRI 2003

SPIDR Concerns Raised



At the Grahamstown IRI meeting in 2003 a number of concerns were raised regarding the integrity of the ionosonde data in SPIDR. We have investigated these issues and an attempt to improved the quality of the database. NGDC appreciates the time and effort of Dr. Weatherhead and colleagues in bringing these potential problems to light. Herein we report on our findings thus far.

Long-term Analysis of Ionospheric Data A SALT Project

Dr. Betsy Weatherhead, Rashid Akmaev, Eduardo Araujo-Pradere, Mihael Codrescu, Ray Conkright, Tim Fuller-Rowell, Rodney Vereck, Xiao-Li Meng, Greg Reinsel, George Tiao

A Number of Concerns with the SPIDR Data Sample of identified problems

- Missing data
- Repeated values
- Extra data
- Data Paths
- Effects of semi-automation
- Full data information
- Conflicts in datasets
- Contacts of data experts missing
- Proper documentation missing
- Inability to access data



Grahamstown IRI 2003

Missing Stations



Issue: The Number of ionosonde stations reported in SPIDR. Non physical transient drops. Slow roll off.

Status:

—44 of 50 received stations available for 2006. SAO 4.0 loading currently being fixed.

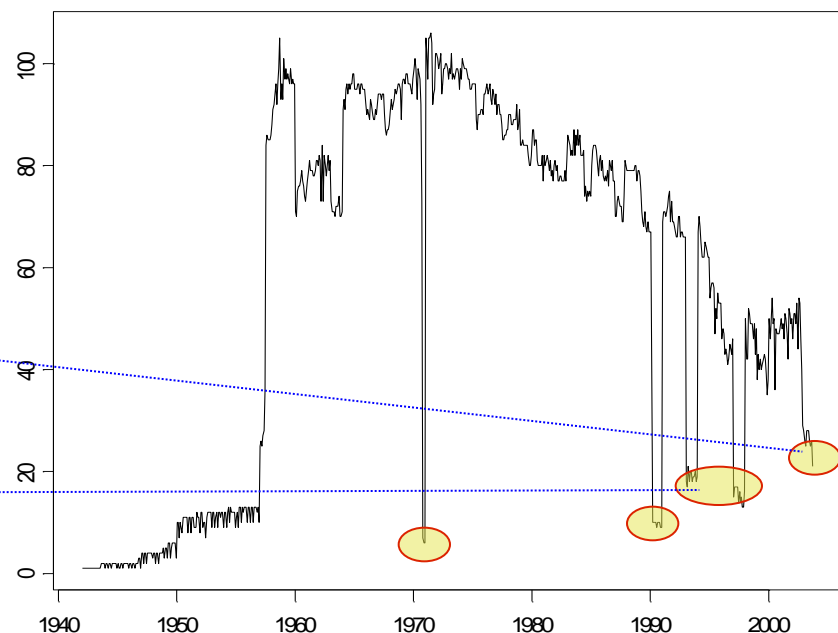
—Last 2 dropouts in 1990's fixed.

—Searching historic archives for other dropouts.

—Slow roll-off due to low NGDC resources for maintaining old and developing new partnerships. Terry Bullett's presence at NGDC is dramatically changing this situation.

Remarks: Ready access to all ionosonde data holdings will expedite reloading process into the Master Ionosonde Data Source (MIDS)

Number of Stations in SPIDR



Weatherhead Fri Sep 26 11:48:55 MDT 2003



Grahamstown IRI 2003

Repeated Values



Issue: Values in SPIDR repeated for hours with strong preference for repetition in post 12UT hours. See vertical stripes on top right and horizontal lines on bottom plot.

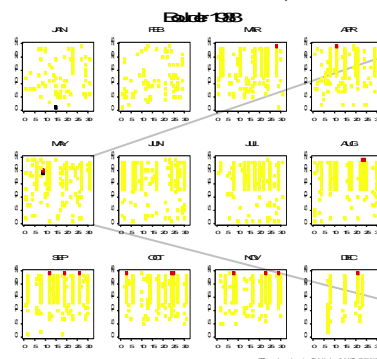
Status: SPIDR ingest failed to flush its input buffer for intervals of no new data.

—Fixed.

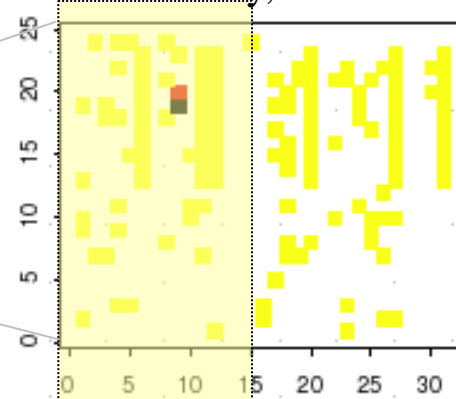
—Hand checking various station years has not revealed additional corrupted time periods (K. Mihalka).

—Comprehensive programmatic scan is underway.

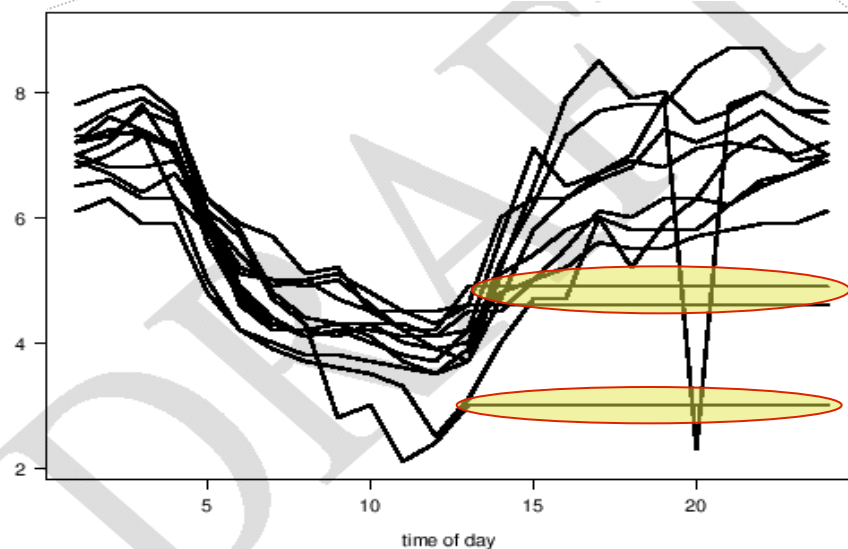
foF2 at Boulder, 1988



May, 1998



foF2 at Boulder, May 1-15, 1988





Grahamstown IRI 2003

Missing Values

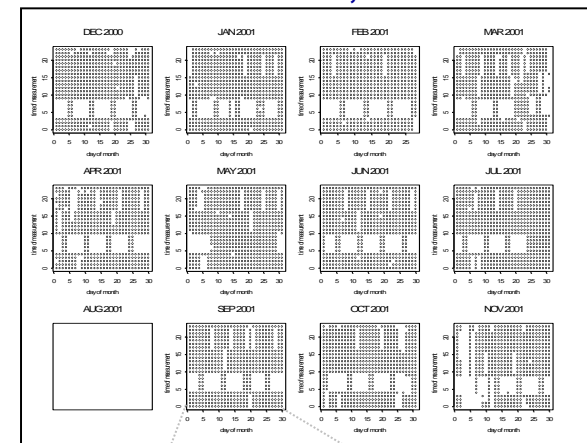


Issue: Systematic non-physical
“holes” in Australian data available in SPIDR.

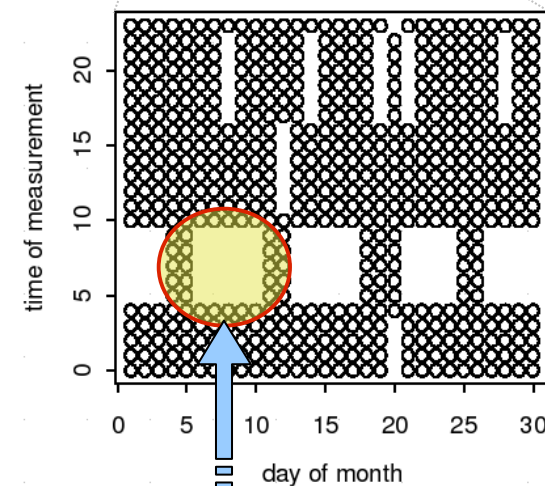
Status:

- Data was processed by NOAA operational space weather component due to a strick need for real time data. Underreported data due to operator errors during certain manpower shifts.
- Similar non physical patterns found in Australian data for several other years and stations.
- Missing August => unknown reason.
- NGDC lacked monthly accounting tools.
- Problem has been fixed at SEC and reloading of Australian data is underway.

Hobart 2001, foF2



SEP 2001



o – Existing data
blank – Underreported data



Boulder Ionosonde Upgrade (also Wallops Island)



Antenna Installation - Wallops Island
August 2006

- Boulder ionosonde is currently being upgraded to a new-generation dynasonde designed and built by Scion Associates
- NASA-funded world-class dynasonde facility at Wallops Island for research and monitoring
- Modern dynasondes provide a wealth of new observations (convective drifts, ionospheric structure, and plasma irregularities)
- Major construction at each site is complete – currently awaiting installation of the ionosonde
- System validation & calibration are planned for 2007

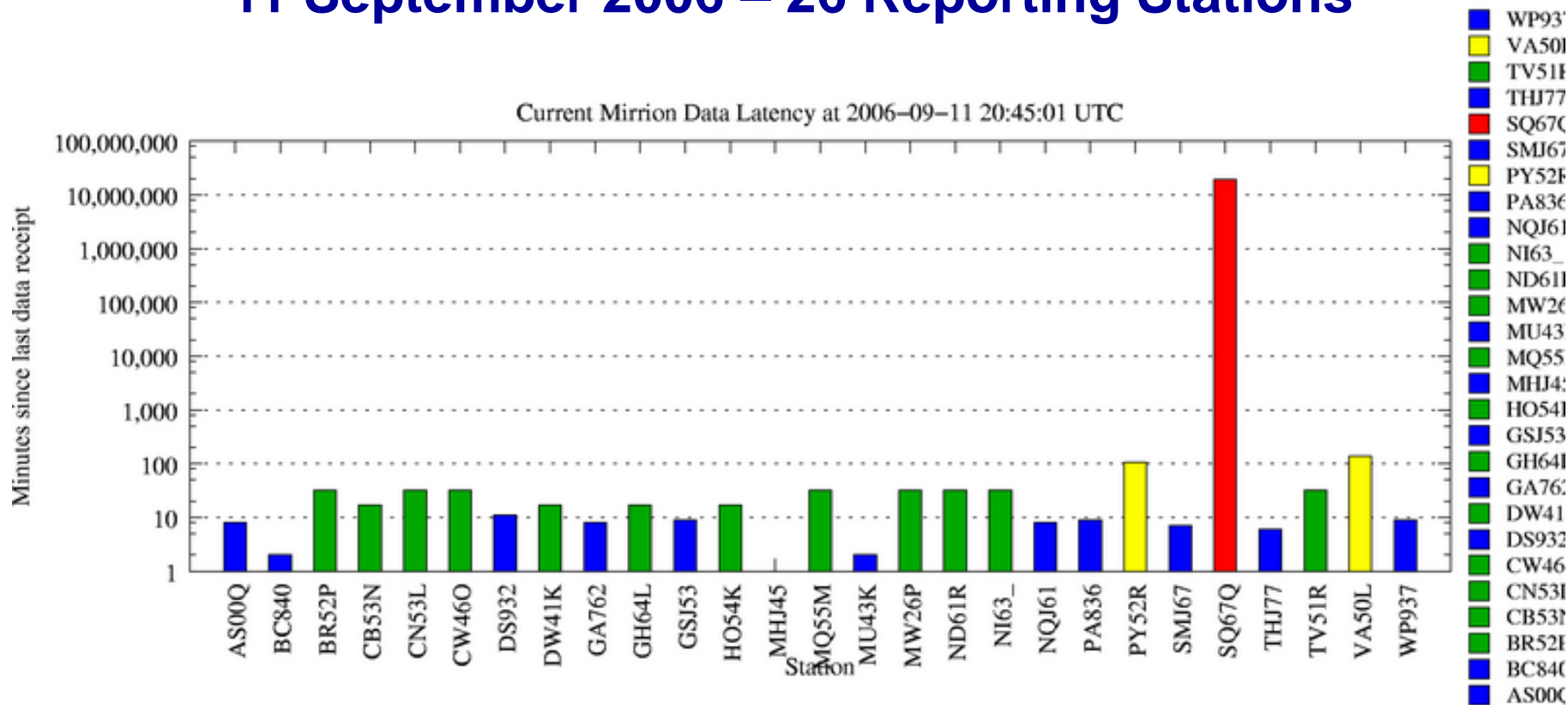


MIRRION



Current Station Reporting Status

11 September 2006 – 26 Reporting Stations



Most data received with a data latency < 100 minutes



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- ➔ • **Concluding Remarks**



Concluding Remarks

STP Program Management Review



METRICS

- **FY06 Publications: 18 FY06 Presentation: 59**
- **Milestones: 15 Completed; 1 Pending; 1 Deleted**

ISSUES

- **Succession: Solar Data Manager – pending retirement 03 Apr 07**
- **Real-time Data Manager – Recent RAID failures necessitate consideration of overall strategy**
- **Metadata strategy – NMMR / GOS / GCMD**